

Information Technology and E-Commerce in Tunisia:
Domestic and International Challenges
and the role for the financial system

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Introduction and Summary

The shock wave of ‘dot-com’ hype and collapse, transmitted by global media and stock markets, has finally worn off to reveal a strong undercurrent of real change propelling forward economies and societies. Globally available networked information technology can yield large economic benefits for businesses, governments, and people in a country. But, the speed of uptake of the technology capital and the pace of transformation of activities in the face of this available capital and the information that it generates is quite different across groups within and across countries.

Where does Tunisia stand in relation to other countries in its income class with regard to domestic use of information technology, and where does it stand in comparison to other countries that are its competitors for export markets? What do data reveal about similarities and differences between Tunisia and other countries in both policies and outcomes? In particular, what is the role for the financial system in contributing to effective use of information technology in Tunisia, in both the domestic marketplace and external marketplace?

Tunisia has a multi-pronged strategy to promote use of information technology--telecoms liberalization, education and entrepreneurship through pilots and in technology parks, IT tax incentives to business, e-government projects. Using IT for financial activities (ranging from monetary transactions to flows of documentary evidence related to these transactions) is the centerpiece of that strategy and represents the commercial fruition of IT.

There has been tremendous progress in the past three years¹, so much so that the financial system probably is no longer the highest hurdle to effective use of information technology in Tunisia. Rather other factors in economy and society (informal economy, high unemployment, business culture, adult illiteracy) appear to be the relatively more important factors reducing the incentives to use IT.

However, there is still more to do in the financial sector to help transform it, so that it can more actively aid in the transformation of the Tunisian economy. With respect to the external market, Tunisia seems reticent to use existing platforms and exchanges, and instead ‘reinvents the wheel’ (example, GLOBUS, own PKI and certification agency). The concern with these national efforts is that they will not enjoy international network benefits, are costly to develop, and will therefore make international financial transactions more difficult and costly.

With respect to the national market, SIBTEL’s management of the national clearance network generates gains to all users, and increases the efficiency of payments—critical for Internet commerce. But, with respect to other clearance markets, there is a fragmented structure that has yet to settle down to one which can enjoy network benefits which are then extended to all users. On the one hand, the common network for credit-card clearance through the payment gateway makes sense and generates these network

benefits. But requiring retail activity at the STB and limiting the links to the international credit-card network to just STB and SMT could act as a choke-point for further development of credit-card usage. The platform developed by APBT is a potential competitor. Once these networks settle down, the gains will be revealed, but currently, the competition increases the costs of engaging in on-line commerce.

These issues are even more striking in the content of the retail market. With respect to retail transactions, the fragmented, multi-layered, and non-interoperable systems (such as ATM and point-of-sale) confuse businesses and the public, leaving them with little sense of the value of engaging in financial activities that use IT. Allowing some financial institutions to lead in technology choice, with other institutions lagging behind (and perhaps exiting the market) may yield a superior outcome for the retail marketplace.

However, financial strategy is not all to blame for the slow up-take of IT in Tunisia. All economies face challenges to using information technology because of a so-called domestic digital divide. Tunisia has a particularly pronounced dual economy. Dualism as reflected in the informal economy, high unemployment, skewed educational attainment, and traditional business culture significantly limit the domestic use of information technology by both consumers and for domestic business transactions.

Some countries use pressure from the external marketplace to guide domestic use of IT. Tunisia external markets are very concentrated on the European Union, which has reduced the incentives for Tunisian businesses to press forward in the use of information technology because European business partners themselves are less intensive users of IT than, say, U.S. business partners. This sheltering in the lee of Europe has reduced the urgency to use IT. More recently, visitors to Tunisia have tended to come from regions where IT is used even less than in Tunisia. But, going forward, if Tunisia wants to get higher value-added activities in the international marketplace, it will need to upgrade along several dimensions: international bandwidth, international currency exchange, and will need to induce businesses to utilize the potential of TunsieTradeNet.

Consequently, Tunisian policy could address the following priority issues:

1. 'Back-office' interbank and international financial exchange: A smoothly functioning domestic interbank market, interoperable secure systems for international transactions, a much liberalized international foreign exchange market remain key to both domestic use and international competitiveness. The liberalized foreign exchange market is particularly pertinent for tourism and for competitiveness vis-a-vis EU enlargement countries.
2. 'Front-office' financial transactions: ATM networks, credit card offerings, and point-of-sale technology remain fragmented, confusing, and may be too expensive for general uptake by consumers and businesses. While competition in these offerings generally is good in a mature market, it appears to be an impediment to domestic use right now in Tunisia. A 'simple' (fewer cards, perhaps free cards and free POS system) could be a potent force unifying the market, and putting

domestic commerce on a positive trajectory for IT use. Allowing a leading financial institution to engage in this kind of marketing could increase the use of IT overall in the economy, generating the transformation gains.

3. One of the particular challenges in the domestic market is convincing local business to use IT for internal operations (accounting, logistics) as well as for financial transactions. Although the technology parks are producing excellently trained students, the curriculum should perhaps focus to an even greater degree on the challenge of producing and marketing software solutions to local business.

Part I of the paper addresses how our understanding of the potential role of information technology in an economy has changed in recent years and briefly outlines the broad framework of policies that facilitate effective use of information technology in an economy. Observations specific to Tunisia are offered as part of this general overview. Part II of the paper addresses two specific challenges facing Tunisia: domestic commercial use of IT and external trade competitiveness. Tunisia is compared with other countries using both hard and survey data using the framework of Part I. Part III fleshes out the Tunisian case drawing on interviews with businesses, financial institutions, government agencies, and academe, concluding with suggestions for areas of priority attention for policymakers. Part IV contains the list of individuals interviewed and their agency or business followed by references consulted in the preparation of this Report.

I: Achieving the Goal of Effective Use of Networked Information Technology

Information technology has been around for a long time. What have we learned about the rewards of *effective use* of information technology, and the policy framework necessary to achieve them? The reward is faster growth, both in the domestic market and through international trade. The policy framework is economy-wide and broad-based. But implementation is country-specific, although clear ‘lessons-learned’ and ‘best practices’ can be found across countries as guidance for policymakers.

Networking, information flow, and transformation: Keys to achieving growth from IT investments

What do we know about the relationship between information technology and growth? Careful research on both industrial and developing countries shows that *investment* in information technology and *transformation* of economic activities to take advantage of what information technology can do deliver big income gains. For the poorest countries, spillovers to the domestic economy from IT investment alone (e.g. just buying the computers and networking them to the outside world via inexpensive telecommunications) may be necessary to jump-start the growth process. For middle-income countries, such as Tunisia, that have more IT in place already, businesses need to be faced with incentives to transform their activities to use the power of IT; otherwise IT is simply an extra cost that does not reward with sales or profits.

Networking the information technology increases its potential value by making information and relationships available to a wider set of individuals, firms, markets and governments, domestically and internationally. These so-called ‘network externalities’ imply that policies toward interoperability of systems (telecommunications, financial payments, distribution) are increasingly important. For a country such as Tunisia, interoperability of these systems, both within the domestic market (for example the interoperability of ATM networks and point-of-sale (POS) retail systems) and internationally (for example credit cards and verification technology and cost of international telecommunications) are potential impediments to networking gains.

With regard to investment, the unusual characteristic of rapidly falling prices for information technology products means that it is advantageous to buy IT on the world market. The declining prices for IT products means that the terms of trade (export prices compared to prices of imported products) are moving in favor of IT importers and against IT producers (just as when coffee prices fall, the terms of trade turn against coffee producers). Thus, getting gains from IT in the domestic economy that come from investing in IT are lower so long as IT is imported tariff and barrier-free from the global marketplace. Although Tunisia has a free-trade agreement with the European Union, and thus imports IT products from there under tariff-free conditions, it is not a signatory to the Information Technology Agreement. Prices for IT products sourced from the European Union are estimated to be about 20 percent higher than global prices. Thus,

Tunisia may not be taking full advantage of global competition in IT to reduce costs of IT to its own domestic users.

Networked technology capital generates and diffuses *information*. The information--which contains market signals ranging from price to product demand to customer preferences to production process quality--flows back to firms, individuals, governments, and the marketplace generally, permitting greater efficiency and opening-up new economic possibilities. Economic gains come when firms, individuals, and governments respond to these opportunities. This response implies a change in activities and demands flexibility in how resources are used in the economy. The policy environment determines to what extent individuals, firms, markets, and governments can and do transform their activities in the face of more information and opportunities.

The strongest evidence that transforming the business environment matters comes from industrial countries, ones where, in comparison to developing countries, there is plenty of IT in place. Researchers find that the benefits of technology capital for productivity growth are lower when rules restrict resource reallocations across firms and sectors in the economy (for example, bankruptcy rules or plant closures) or when there are rigid organizational relationships within firms (such as restrictions on changing work rules or firing workers), or when there is insufficiently supportive training (for example in preparatory computer use in the classroom).

In Tunisia, high unemployment, the large informal economy, as well as traditional business culture reduce the incentives for firms to use IT capital in place of labor for a range of activities. Moreover, concern about how the government might use information thrown-off by the use of IT (say to consolidate information for tax purposes) or how hackers might use information (such as bank account numbers) further reduces the incentives for businesses or individuals to use IT particularly for financial transactions.

The incentives to use IT from international markets have been more pressing for Tunisia's internationally engaged firms. But, the tight trade links to Europe (as opposed to the U.S.) means lighter demands to rapidly upgrade IT capital and how it is used in the business and financial processes. The new accession countries in Europe (which are more intensive perhaps than even original EU members in their use of IT and in their human and physical IT capital resources) may present important new challenges for Tunisian exporters.

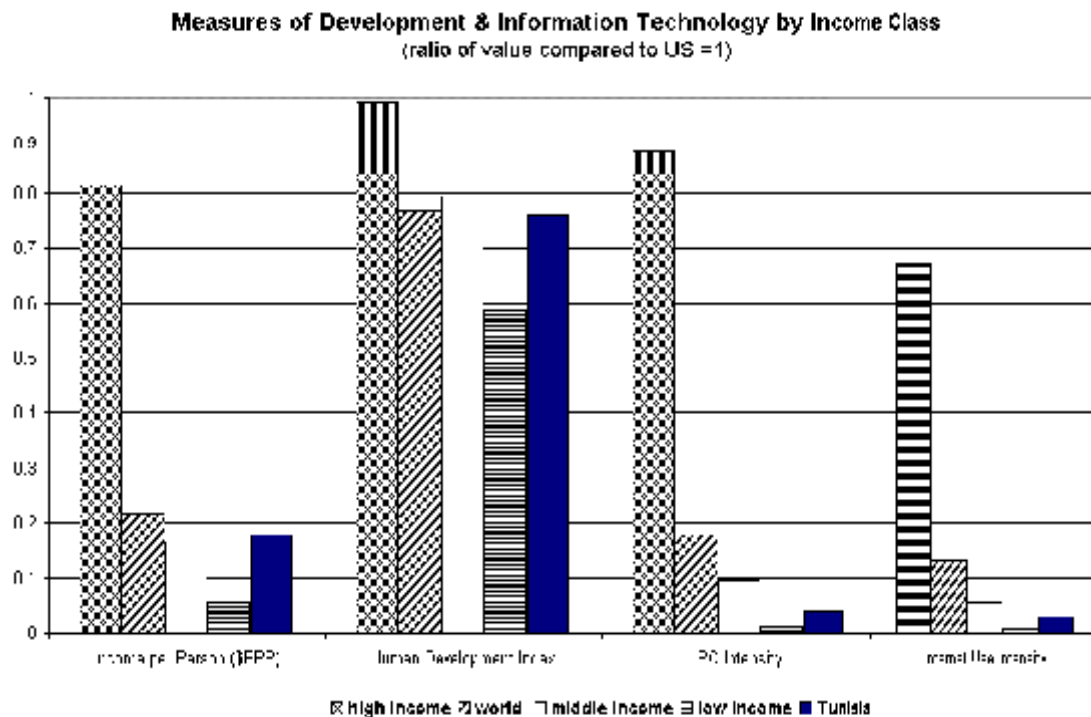
Today's global environment has a rapid innovation, faster information processing and higher content of information in business processes, and more important international markets and alliances. All this puts a premium on having an environment in which individuals, firms, and governments are confident that they can take advantage of opportunities as they are presented and can respond rapidly, flexibly, and on an on-going basis. The New Economy is not a static outcome; it is a dynamic process. Tunisia will not ever 'be done' with respect to its policies or business response to IT. Consequently, rules and regulations need to keep this dynamism in mind to avoid legislating away potentially attractive new solutions to domestic and international use of IT.

Measures of Economic and Digital Development: Where Does Tunisia Stand?

Common features distinguish developing countries from industrial countries along broad and narrow measures. Chart 1 shows measures related to development (income per person and the human development index) and measures related to information technology (PC intensity and Internet use intensity) for various income and regional groups and for Tunisia.

In terms of traditional measures of economic development, Tunisia is solidly a middle-income country. But, in terms of digital development as measured by PC intensity and Internet-use intensity, it falls well below the middle-income group. Considered from a regional perspective, Tunisia's measures of economic and human development are close to world average, about halfway between Latin American (LA) regional development and East-Asia and Pacific (EAP) regional indicators. Tunisia stands above the average for the Middle East and North Africa (MENA). In terms of digital development, PC intensity in Tunisia falls off a bit more than income when compared to LA and EAP regions, and even is lower than the MENA regional average. However, in terms of Internet-use intensity (which accounts for the fact that people may utilize the Internet from shared facilities, as for example via Publinets), Tunisia looks a bit better.

Chart 1: Measures of Economic and Digital Development



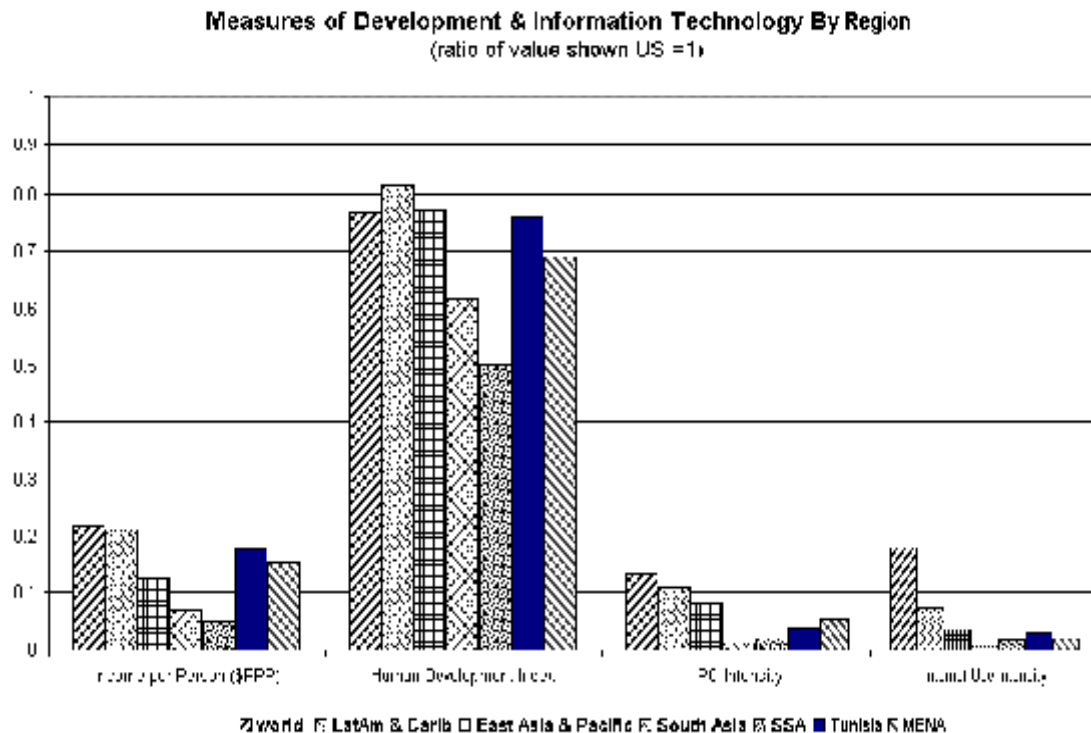
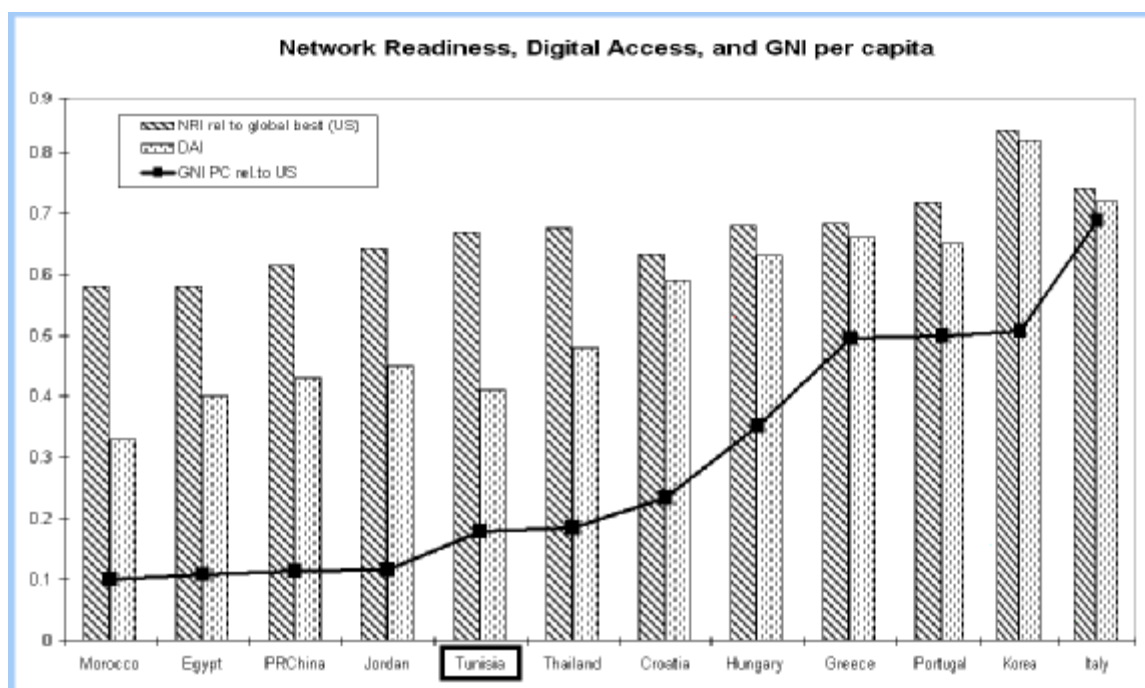


Chart 2 shows a set of comparator countries for Tunisia (why these countries are chosen will be discussed later), their gross national income (GNI) per capita and two indicators related to information technology. One, the Network Readiness Index (World Economic Forum) is derived from some 48 hard and survey data on the “environment” (including market, political and regulatory, and infrastructure), and “readiness” and “usage” by individuals, businesses, and government.² The other, Digital Access Index (International Telecommunications Union) combines 8 different hard data indicators, and puts considerably more weight on issues of education and literacy.³

The Digital Access Indicator is more closely associated with GNI per capita. For Tunisia, the DAI appears somewhat lower than what would have been expected based on the data for GNI. The low adult literacy rate is what drags down the DAI for Tunisia. On the other hand, the Network Readiness Index for all countries is modestly related to GNI. Further dissection of these indexes will be done later, to reveal areas for possible policy focus.

Chart 2: Information Technology and Development: Comparator Countries



Policy Framework For Effective IT Use

Policy choices shape the environment for business transformation, whether the winds of change principally blow into the economy from outside via international trade or from inside via policy reform and technological innovation. Key elements of the domestic environment that enable business to response to change, particularly change related to information technology, are (1) Telecommunications infrastructure: Conveying information is at the heart of why information technology can transform an economy. So telecommunications infrastructure, access, price, and performance, in the domestic market and international linkages, matter more than ever. (2) Financial infrastructure: Financial intermediaries must be able to sort-out what are good and poor opportunities, whether those be in micro-enterprise or multi-national. Moreover, because more transactions can happen with the speed of the Internet, the financial infrastructure needs to be able to process electronic payments in real time, both inside an economy and across international borders. (3) Overall business climate: Pro-competitive market rules and transparency of the business environment encourage transformation in business, product, and labor markets. If businesses invest in new equipment but then cannot change the activities of labor inside the firm, technology becomes a cost not a benefit. (4) Education and skills: Lack of educated workers means that businesses can't apply technology or use new ideas at home.

These areas for policy-maker attention are not new, but in the midst of national strategies, innovation policies, programs for small-and-medium size enterprises (SME), and human development initiatives—and surely there is a role for targeted government efforts in these areas—such targeted efforts will not broadly affect the economy unless the

underlying policies yield the right business incentives. For example, without a facilitating business environment supported by the right policies, R&D spending and the fruits of innovation efforts will fall on stony ground. Or, tepid domestic and foreign competition allows businesses to “get away with” less innovative processes, goods, or services. Further, educated workers, the result of human resource policies, will leave the country if there is little prospect for starting a company or using their skills at home.

II: Internal and External Challenges to Use of IT: The Tunisian Case

Policy choices shape the domestic environment in which information technologies take hold and are used widely, or not. What should policymakers aim for to improve infrastructures and to enhance the chances that IT will be used effectively? How should they decide on a strategy of reform to maximize the benefits of their IT investments?

A policymaker could simply look at their own country's policies and strike out in a direction of reform. Doing so ignores the increasingly useful body of knowledge on what types of policy reforms are most productive to pursue. The alternative approach is to benchmark a country's policies and outcomes against those of other countries.

The challenge then becomes determining what are good comparator countries. Whereas looking at the "global best" (e.g. highest PC penetration or best technology index) has some value, this is probably unattainable in the near term, may provoke backlash or a defeatist attitude, and could even misdirect policy attention from what really matters. Rather, picking a set of countries of more similar income levels, technology attainment, size, and economic performance may make more sense. Moreover, finding comparator countries gives each country's policymakers an idea of the policy foundations and economic outcomes in countries "like them." Having a framework for analyzing policies and specific comparator countries can also start a practical dialogue between policymakers of various countries about what works and what does not work in countries of broadly similar situations.

IT and the Challenge of International Trade Competitiveness

International trade has always been an important channel through which competition, innovation, and technical change have affected industry behavior and economy-wide productivity growth. If anything, information technology super-charges these forces, increasing the demands on policymakers to enable a facilitating environment so that industry can respond to the international challenge. Why is this so? The global value chain of production demands increasingly intensive use of information technology. So far, we've seen that Tunisia's tight links with the EU has, if anything, tended to insulate Tunisian firms from the most intensive international competition and demand to use IT. Going forward, the question is whether Tunisian firms will be able to compete with other potential suppliers to the European market and keep their position on the value chain.

Three pieces of information can help policymakers and business understand the nature of the external challenge: Intensity of IT use by industry sector (some sectors have integrated IT a lot in international trade, others less so); sectoral trade patterns of Tunisia (to see how concentrated the trade pattern is, or is not, in the sectors that use IT intensively); and policy environment facing Tunisian business at home (to see if Tunisian businesses could be hampered in using IT). Combining information on IT use by global industry leaders with sectoral patterns of Tunisian trade points to which Tunisian industry sectors are most exposed to the need to use networked information technologies effectively because their value chain partners use IT intensively.

However, Tunisian firms are not operating in a vacuum. Other countries are engaged in these same calculations. Tunisia's situation needs to be compared to that of potential international competitors for Tunisia's international markets. Do Tunisia's business enjoy the relatively better business and policy environment to enable them to more rapidly transform in response to the demands of international competition, or not?

Measuring Intensity of Networked IT Use by Global Leaders

The nature of the production process (for both manufacturing and services) is becoming increasingly fragmented, globalized, and IT-intensive. Multinational firms and strategic business alliances communicate, get price quotes, submit bids, transfer data, offer customer service, produce product designs, code software, and basically do business using networked information and communications technologies in the international arena. Economies' whose environment constrains the extent to which businesses can respond to demands of their value-chain partners and customers will be marginalized from the global production process.

But, the uptake and intensity of use of networked information technologies, even by the global leaders, differs across sectors. Distilling several different analyses of how networked ITs have affected the operations of U.S. and European firms yields a summary indicator of IT intensity for each sector, shown in Table 1 below. A lower value means that IT is not as integral to the activities of the global value-chain partners and customers.

Table 1: IT Intensity Benchmark, by sector	
Foods	4
Consumer goods and textiles	3
Energy, chemicals, natural resources	1
Pharmaceuticals	4
Forest/paper products	4
Steel/metals and metal products	1
Industrial equipment & Supplies	3
Electronic Components	5
Autos	3
Tourism	5
Source: Mann (2002)	

Measuring Exposure to IT Intensity through International Trade

What evidence from Tunisia's pattern of trade suggests that information technology use may be important to international competitiveness? The top panel of Chart 3 combines data on what Tunisia trades in international markets with the benchmark indicator measure of IT intensity from Table 1. The vertical axis measures share of exports and of imports (centered in each circle) of different industry-sectors in Tunisia trade; the sectors are arranged along the horizontal axis by SITC classification, starting with foods and

ending with tourism.⁴ The size of the circle indicates how intensively IT is integrated into the production and trade processes of the sector. The larger the circle, the more integrated IT is into the globalized production process of the good or service. There are two circles for those sectors that are part of an international value chain—such as imported textiles being transformed in Tunisia into exported clothing, or auto parts and electronics being imported to Tunisia for further transformation, and then re-exported. For other categories, such as tourism, only one circle is shown for exports, since the value chain ends on the beach!

The largest share of Tunisian exports and imports is in consumer textile products, where the benchmark IT intensity is in the middle of the range for all sectors. A substantial additional share is in the highest benchmark IT intensity sector of tourism. Additional exposure is in the category of food products, which is second-highest among these industrial sectors in its use of information technology, and minor shares of trade are in electronic products, which like tourism, is the highest intensity use of IT in trade.

By way of comparison, the bottom panel of Chart 3 shows the same presentation for Korea's pattern of trade. Korea's merchandise trade is highly concentrated in electronic products in both imports and exports, with another large share in the consumer textile category. Compared to Tunisia, Korea's pattern of trade is more concentrated in sectors that demand the highest intensity use of IT.

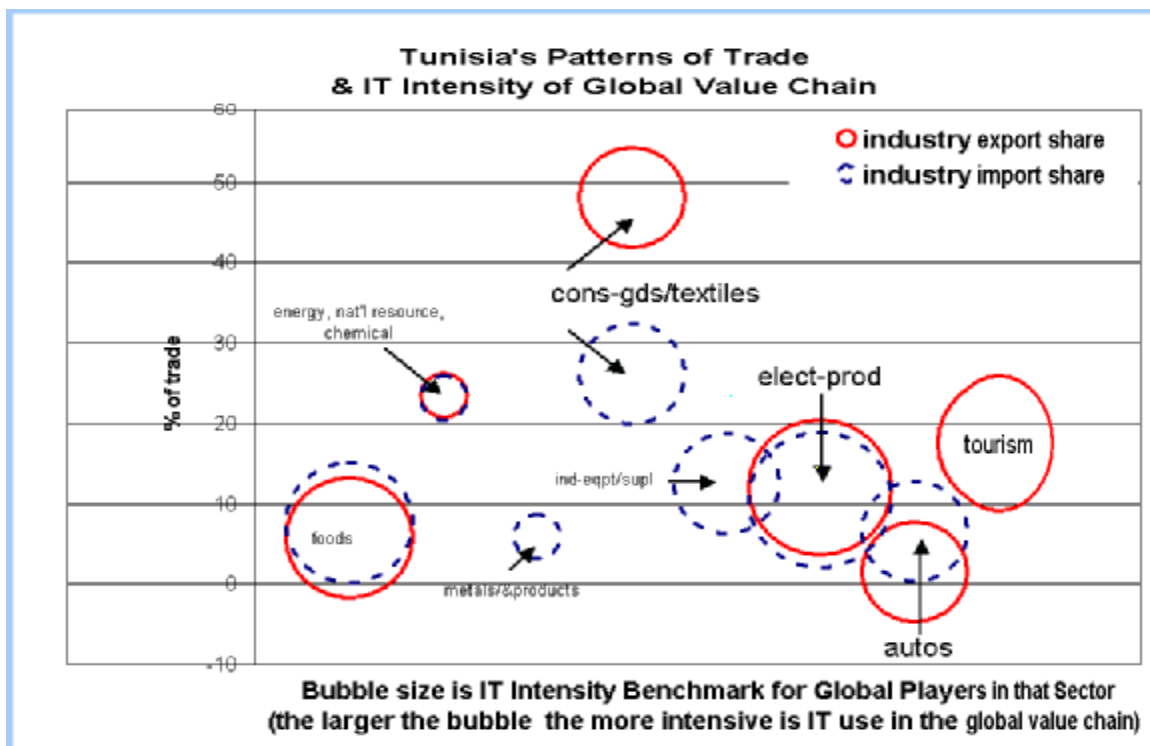
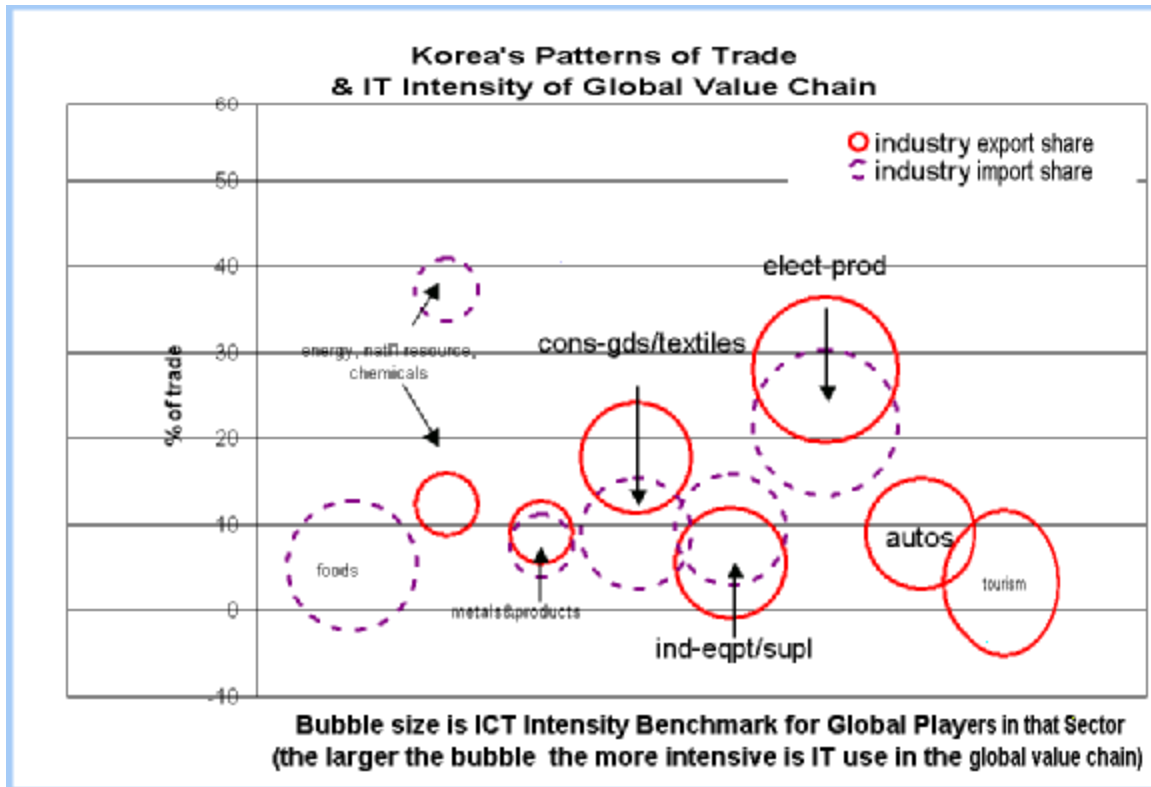


Chart 3: Trade patterns for Tunisia and Korea



Who are the international competitors?

To determine who are the international competitors for Tunisia's consumer textiles trade, we turn to the Trade Performance Index.⁵ This index considers (1) the share of the country's export sector in world trade, (2) the sectoral trade balance (net exports) and, in order to control for the size of the economy, (3) per-capita exports. In addition, export competitiveness is related to the ability to (4) differentiate export products within a given sector and (5) diversify export markets. These five indicators are summarized in the Trade Performance Index which is constructed for 14 industry-sectors for 75 countries.⁶ Based on this index, Tunisia competes with Italy, China, Portugal, Korea, Hungary, and Thailand (ranked 1 to 6 in the world by the Trade Performance Index for export competitiveness in clothing and textiles). One perspective that comes from using this trade performance is that Tunisian exporters face competition on many dimensions: diversity and quality (Italy), cost (Thailand and China), and proximity (Portugal and Hungary).

The Trade Performance Index is not calculated for tourism, but a similar strategy is used. Countries that are Tunisia's international competitors are judged based on importance of receipts as a share of exports, beach and historical interest, country size, and distance. Based on this assessment, Tunisia's competitors are: Croatia, Egypt, Greece, Jordan, Morocco, and Portugal.

In sum these are the economies against which Tunisian firms competes in two very important international products. How do Tunisia's business and policy environments stack up against the business and policy environments in the competitor countries?

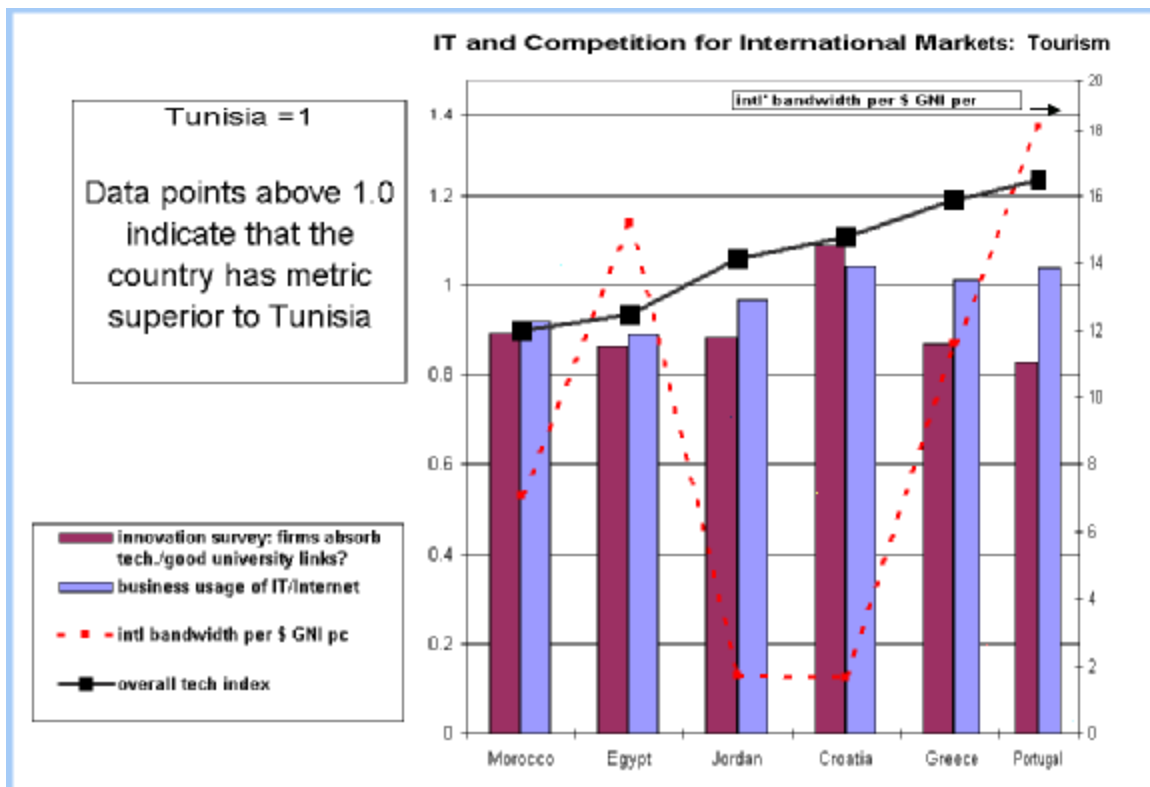
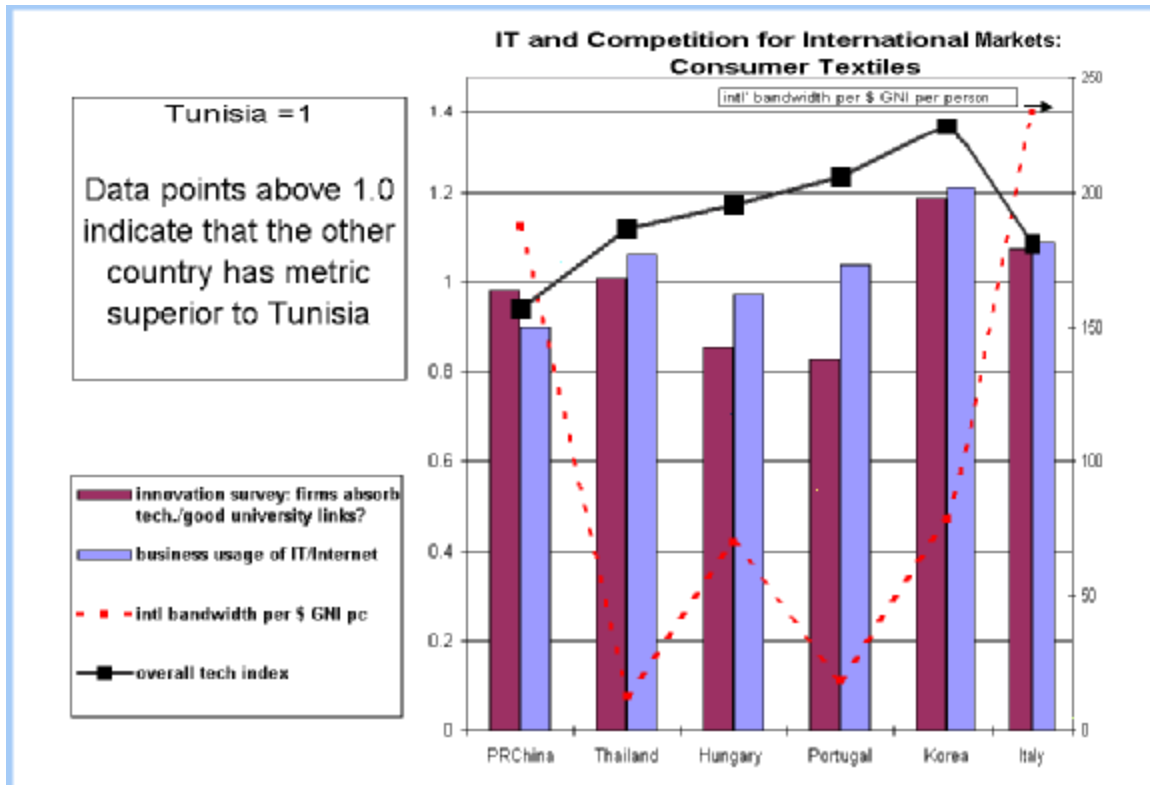
Comparing the Business and Policy Environment: Tunisia vs. the Competition

It is a difficult and complex problem to try to evaluate and measure an economy's policy conditions and the extent to which the business environment that results is conducive for firms to invest in and effectively use IT in their international trade operations.

Nevertheless, policymakers should consider such an assessment to promote introspection and internal policy debate. In any case, foreign and domestic investors make their own judgments based on a broad array of indicators.

Several indicators including both hard data and surveys measure the extent to which firms in a country are able to effectively use IT in international operations. First, firms must have international bandwidth. The variable considered here is international bandwidth per dollar of GNI per person.⁷ The second variable is an overall indicator of how technology is created and diffuses throughout an economy, calculated from hard data on innovation (patents and tertiary enrollment), and survey indicators on the extent to which firms absorb technology, the extent to which the government promotes IT, and the extent to which technology is received through foreign direct investment.⁸ The third variable presents the survey data on firm's attitudes on uptake of technology and public-private university linkages to generate new technology. Finally, survey information of businesses use of IT and the Internet rounds⁹ out the indicators to compare the Tunisian international trade environment to that of competitors for the two markets of interest: consumer textiles (Chart 4) and tourism (Chart 5).

In the charts, all data are normalized to Tunisia equals one. Therefore, when the bar for a competitor country extends above 1.0, this means that the trade competitor "scores" higher on that indicator than does Tunisia. A higher "score" suggests a network use or a business environment that is more enabling for firms to use IT effectively and to transform themselves to meet the demands of the global value chain.



The first observation from both charts is that Tunisia's international bandwidth per dollar of GNI per person is extremely low—below that of all of the other countries in both samples. This is an important hurdle for international business. Second, Tunisia's overall indicator of technology uptake is below that of most of its trading partners, except China, Morocco, and Egypt. This is because of Tunisia's few contributions to patents and technology transfer through FDI. However, when we focus more explicitly on how firms adapt to new technology (the innovation indicator and the business usage of IT and the Internet), Tunisia's numbers look better.

Consider each export market separately. In consumer textiles, Tunisia may well face more competition from China, which is both low cost, and not that far behind in terms of metrics of innovativeness. With respect to competitors within the EU, including the enlargement countries, it appears Tunisian firms are more willing to adopt new technology than are Portugal and Hungary, although Portuguese firms appear to use IT more and Hungary is not far behind Tunisia. With respect to the upscale market, however, Tunisia will have to compete with Korea, where the metrics of innovation and business use are far superior. What Tunisia needs to avoid is being squeezed between China on cost, Hungary and Portugal on availability of better support for international trade (bandwidth and currency) and Korea and Italy on quality and speed to market.

If Tunisian firms could have a supportive environment of telecoms, international foreign exchange, and customs logistics then they would have a good shot at moving up the value chain in the consumer textiles market by more rapidly assimilating new technologies of production. The TunisieTradeNet project, while it improves customs clearance procedures, is hamstrung by the limited international payments capability. Moreover, the lack of urgency to move to a computer-based system for internal accounts is also reflected in limited usage of TTN and the layers of business, brokers, and bankers. All told, the lack of international bandwidth, the limited convertibility of the dinar, and slow up-take of TTN's logistical capabilities put Tunisian international competitiveness at risk.

With respect to the international tourism market, Tunisia faces less competition. First, although the international bandwidth figures are lower for Tunisia than any competitor country, the gap is not so great. Second, most of the other countries (except Croatia and Portugal) have less innovative firms and lower businesses usage than does Tunisia. Therefore, among the countries in the region Tunisia could use its superior measures of innovativeness to bring more tourist value added to the country. One caveat to this rosy picture is that many of Tunisia's tourist operators are more like individuals rather than businesses. Individual use of the Internet and IT is substantially lower in Tunisia than is business use (a point discussed in more detail in the next sector). Another caveat is that Thailand (presented in the discussion of consumer textile trade) is also a tourist destination (albeit more distant) and has better access and innovation metrics than Tunisia. A third caveat is that in recent years, tourists to Tunisia have increasingly come from countries whose use of information technology and the Internet is well below that of Tunisia. This means that Tunisian operators may not be receiving much in the way of market incentive to upgrade the use of IT in their international tourism activities.

IT and the Challenge in the Domestic Marketplace

In order for a country to enjoy the full benefits of information technology, it must be widely dispersed throughout an economy. Some celebrated cases of economic success from exporting information technology (such as Malaysia for IT hardware and India for IT software) mask limited domestic gains. How does Tunisia compare with the economies already presented?

Chart 6 shows the usage-to-readiness ratio for business, individuals, and government sectors, along with GNI per capita.¹⁰ Several observations emerge. First, for all countries, the usage relative to readiness for individuals is much lower than for businesses. And, there is a positive relationship between country income and the usage by individuals. Among its income class, Tunisia's individual usage is about as expected, which is perhaps surprising given the focus of government effort on awareness (Internet caravans), access (Publinets), and payments (e-dinar). Second, there is a negative relationship between government as a robust user and GNI per capita. This is consistent with efforts by governments in lower income countries to be the leaders in deploying IT. Tunisia's relatively lower figure is a bit surprising given the government efforts through such projects as TunisieTradeNet and the Payments Gateway.

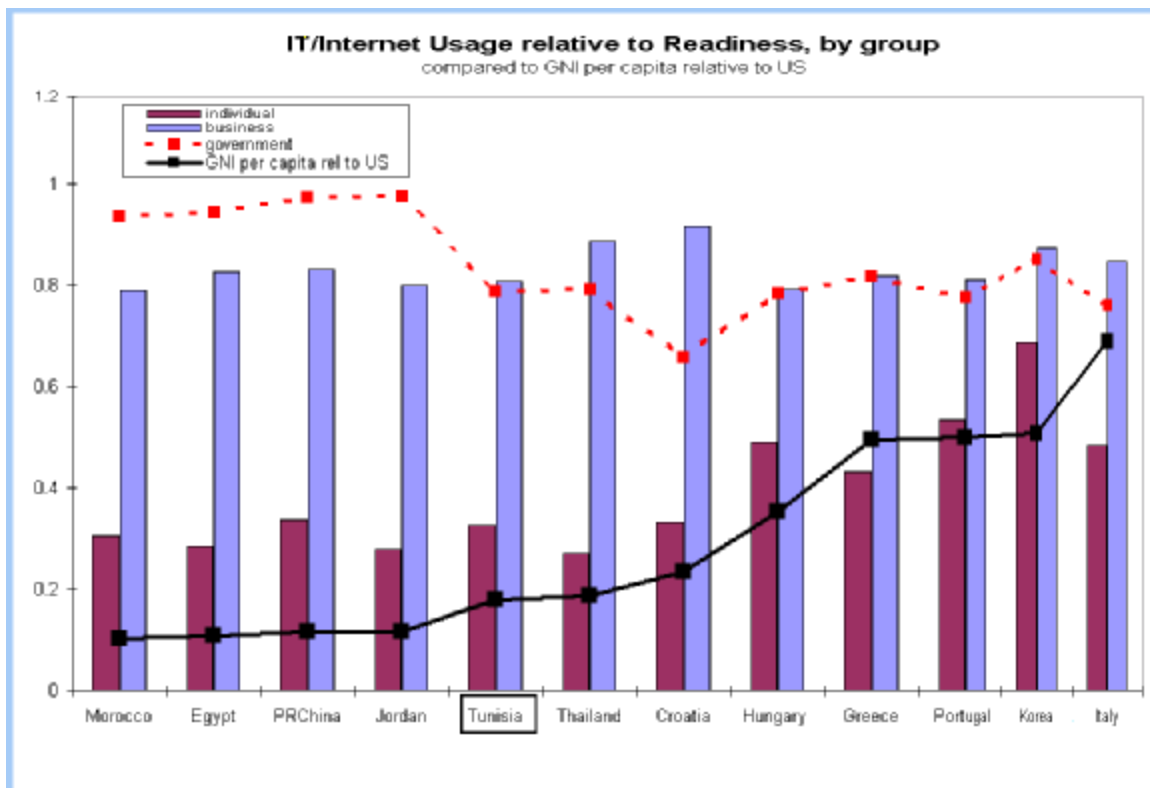
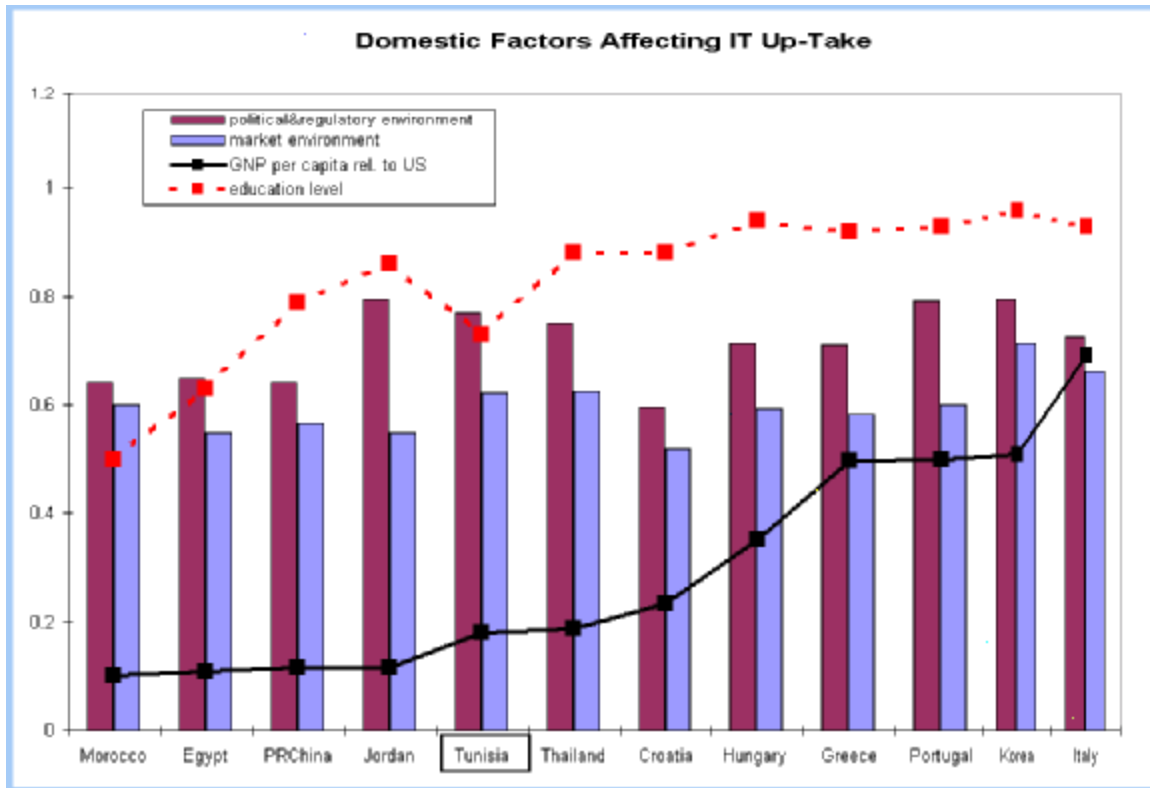


Chart 7 points out several specific factors that underlie these usage figures: the political and regulatory environment (which includes data on administrative burden, legal system, foreign ownership restrictions, freedom of the press), the market environment (which

includes data on a variety of factors including cluster development, scientists and engineers, patents, venture capital),¹¹ and the overall educational level (adult literacy as well as enrollment ratios for schooling.)¹² Here the most notable challenge facing Tunisia is with regard to adult literacy.



III: Conclusions and Suggestion for Policy Priorities

Focused policy effort in the financial sector has yielded substantial progress. The financial system by itself probably is no longer the highest hurdle to effective use of information technology in Tunisia. Rather other factors in economy and society (informal economy, high unemployment, business culture, adult illiteracy) appear to be the relatively more important factors that are reducing the incentives to use IT.

However, there is still more to do in the financial sector so that it can more actively aid in the transformation of the Tunisian economy. In broad terms, Tunisian policy and financial firms have not been exploiting existing global network externalities to reduce the costs of providing financial services using IT. With respect to the external market, Tunisia seems reticent to use existing platforms and exchanges, and instead “reinvents the wheel” (example, GLOBUS, own PKI and certification agency). The concern with these national efforts is that they are costly and take a lot of time to develop, do not enjoy international network benefits, and will therefore make international financial transactions more difficult and costly.

With respect to the national market, SIBTEL’s management of the national clearance network generates gains to all users, and increases the efficiency of payments—critical for Internet commerce. But, with respect to other clearance markets, there is a fragmented structure that has yet to settle down to one which can enjoy network benefits, which are then extended to all users. On the one hand, the common network for credit-card clearance through the payment gateway makes sense and generates these network benefits. But requiring retail activity at the STB and limiting the links to the international credit-card network to just STB and SMT could act as a choke-point for further development of credit-card usage. The platform developed by APBT is a potential competitor. Once these networks settle down, the gains will be revealed, but currently, the competition increases the costs of engaging in on-line commerce and requires that the financial sector entities focus on continually upgrading their IT to meet new demands, rather than focusing on the core business of banking.

These issues are even more striking in the context of the retail market. With respect to retail transactions, the fragmented, multi-layered, and non-interoperable systems (such as ATM and point-of-sale) confuse businesses and the public, leaving them with little sense of the value of engaging in financial activities that use IT. Allowing some financial institutions to lead in technology choice, with other institutions lagging behind (and perhaps exiting the market) may yield a superior outcome for the retail marketplace. In particular, the e-dinar project, which may have been a useful first step with stored value cards, should be re-evaluated. Unless there is evidence that the e-dinar project reaches the non-bank community, it perhaps should be phased out.

However, financial strategy is not all, or probably even much, to blame for the slow uptake of IT in Tunisia. All economies face challenges to using information technology because of a so-called domestic digital divide. Tunisia has a particularly pronounced dual economy. Dualism as reflected in the informal economy, high unemployment,

skewed educational attainment, and traditional business culture significantly limit the domestic use of information technology by both consumers and for domestic business transactions. With high unemployment, there is no incentive to use IT to transform the activities of business—why file customs papers electronically when there are numerous helpers and runners to take the paper copy to the office? Why bother to use direct deposit when a family member walks right by the bank anyway? Why employ accounting software if that means that the government can link more information together and potentially impose a higher tax liability? As another indicator that business transformation is stalled in Tunisia is unused “mise a niveau” funds and the “investment gap” calculated by the World Bank.

Some countries use pressure from the external marketplace to guide domestic use of IT. Tunisian external markets are very concentrated on the European Union, which has reduced the incentives for Tunisian businesses to press forward in the use of information technology because European business partners themselves are less intensive users of IT than, say, U.S. business partners. This sheltering in the lee of Europe has reduced the urgency to use IT faced by Tunisia. With the first stage of European enlargement complete and the end of the Multi-Fibre Arrangement imminent, Tunisia may face heightened international competition for its export markets.

One outcome could be that Tunisia would move down-market rather than up-market. In consumer textiles, Tunisia producers could compete on price with China rather than use IT intensively and link more directly to the buyers in Europe and the US. In the case of tourism, visitors have increasingly come from countries whose use of information technology and the Internet is well below that of Tunisia. From the standpoint of Tunisian economic well-being, this movement away from the IT frontier to second-tier status must be avoided.

If Tunisian firms could have a supportive environment of international bandwidth, international foreign exchange, and customs logistics then they would have a good shot at moving up the value chain in the consumer textiles and tourism markets by more rapidly assimilating new technologies of production. The TunisieTradeNet project, while it improves customs clearance procedures, is hamstrung by the limited international payments capability. Moreover, the lack of urgency to move to a computer-based system for internal accounts is also reflected in limited usage of TTN and the layers of business, brokers, and bankers. All told, the lack of international bandwidth, the limited convertibility of the dinar, and slow up-take of TTN’s logistical capabilities put Tunisian international competitiveness at risk.

To address some of these issues Tunisian policy could consider the following priorities:

1. ‘Back-office’ interbank and international financial exchange: A smoothly functioning domestic interbank market, interoperable secure systems for international transactions, a much liberalized international foreign exchange market remain key to both domestic use and international competitiveness. International bandwidth is dramatically low and could serve to limit international competitiveness of Tunisia firms. A liberalized foreign exchange market is

particularly pertinent for tourism and for competitiveness vis-a-vis EU enlargement countries.

2. 'Front-office' financial transactions: ATM networks, credit card offerings, and point-of-sale technology remain fragmented, confusing, and may be too expensive for general uptake by consumers and businesses. While competition in these offerings generally is good in a mature market, it appears to be an impediment to domestic use right now in Tunisia. A simplified system (fewer cards, perhaps free cards and free POS system) could be a potent force unifying the market, and putting domestic commerce on a positive trajectory for IT use. Allowing a leading financial institution to engage in this kind of marketing could increase the use of IT overall in the economy, generating the transformation gains. As part of this effort, the e-dinar project should be evaluated to see whether it serves an important purpose in reaching the non-banked population.
3. One of the particular challenges in the domestic market is convincing local business to use IT for internal operations (accounting, logistics) as well as for financial transactions. Although the technology parks are producing excellently trained students, the curriculum should perhaps focus to an even greater degree on the challenge of producing and marketing software solutions to local business. Only students who are familiar with the specifics of the Tunisian business context can produce software solutions to meet the needs of local business.

IV: Appendix Material

Material Consulted and Referenced

Agence Nationale de Certification Electronique, “Le Certification Electronique”.

Ahn, Choong Ong and Yang, Doo Yong (2003) “E-Finance Development in Korea” Presentation at the meeting “*Diffusion and Effective Use of Information Technology- A Latin-Asian Dialogue on Initial Conditions and Policy Challenges*” Washington, D.C., Institute for International Economics, May 9-10.

Bayoumi, T and M. Haacker (2002) “It’s Not What You Make, It’s How You Use IT: Measuring the Welfare Benefits of the IT Revolution Across Countries”, IMF Working Paper WP/02/117. Washington: IMF.

Ben Sassi, (2003) Commerce Electronique en Tunisie, Situation et Perspective, Presentation at UNCTAD

Blanke, Jennifer, Fiona Paula, Xavier Sala-I-Martin (2004), “The Growth Competitiveness Index: Analyzing Key Underpinnings of Sustained Economic Growth,” Chapter 1 in Global Competitiveness Report 2003-2004, World Economic Forum.

Botelho, A.J.J (2003) “IT and the Financial System in Brazil,” Presentation at the meeting “*Diffusion and Effective Use of Information Technology- A Latin-Asian Dialogue on Initial Conditions and Policy Challenges*” Washington, D.C., Institute for International Economics, February 3-4.

Bouزيد, Abdelkarim, “Paiement Electronique via Internet, e-dinar”

Cornelius, P.K., F. von Kirchbak, M. Mimouni, J-M. Pasteels, and S. Phadke (2002), “Sectoral Trade Performance” chapter 2.4 in Global Competitiveness Report 2001-2002 edited by M. E. Porter, J.D. Sachs, P.K. Cornelius, J.W. McArthur, K. Schwab, Oxford University Press: New York.

Dutta, Soumitra and Amit Jain (2003) “The Networked Readiness Index 2003-2004: Overview and Analysis Framework,” in Global Information Technology Report 2003-2004, World Economic Forum.

ECA/IDRC Pan-African E-Commerce Mission North African Team (2003), Tunisia Country Report.

Guellouz, Ridha (2001), L’approche Tunisienne en Matiere de Commerce Electronique (May).

Harper, Jerry W. (2001) "Securing E-Commerce in Tunisia," Report to Commercial Law Development Program, US Dept. of Commerce, June 25.

Institute for Management Development (2002), IMD World Competitiveness Yearbook.

International Monetary Fund (2003) "Tunisia—Concluding Comments of the Interim Staff Visit", December 19, 2003.

IRIS Center of the University Research Corporation International, University of Maryland "POLICY REFORM TOOLKIT FOR E-COMMERCE & ICT DEVELOPMENT" (2003) University Research Corporation International, J.R. Westby, C.L. Mann, D.E. Owen.

ITU Press Report (2003) "ITU Digital Access Index: World's First Global ICT Ranking Education and Affordability Key to Boosting New Technology Adoption," November 19.

Kirkman, Geoffrey S. Carlos A. Osario, Jeffrey D. Sachs, (2002) "The Networked Readiness Index: Measuring the Preparedness of Nations for the Networked World (Chapter 2)," Global Information Technology Report, World Economic Forum, Oxford University Press.

Kraemer, Kenneth L. and Jason Dedrick (2000) "Information Technology and Economic Development: Results and Policy Implications of Cross-Country Studies," in Information Technology, Productivity, and Economic Growth International Evidence and Implications for Economic Development M Pohjola ed. Oxford University Press pp 257-280.

Lee, Y. S., and Seo H.Wan (2001) "Contribution of Information & Communication Technology to Total Factor Productivity and Externality Effects in 38 Countries." Korea Telecommunications Policy Review (in Korean).

Mann, C.L. (2004)"Information Technologies and International Development: Conceptual Clarify in the Search for Commonality and Diversity," *Information Technology and International Development* vol 1:2.

Mann, C.L. (2002) "Electronic Commerce, Network Readiness, and Trade Competitiveness," in G.S. Kirkman, P.K. Cornelius, J.D.Sachs, K. Schwab eds, Global Information Technology Report 2001-2002, Oxford University Press: New York.

Mann, C.L, S.E. Eckert, S.C. Knight (2000) Global Electronic Commerce: A Policy Primer, Institute for International Economics: Washington DC.

Mann, C.L., D.H. Rosen, and APEC (2001) The New Economy and APEC, APEC Secretariat: Singapore and reprinted by Institute for International Economics: Washington DC.

Oxford Business Group (2003) Emerging Tunisia 2003.

Pohjola, M. (2001) “ Information Technology and Economic Growth: A Cross-Country Analysis ” in Matti Pohjola, ed. Information Technology, Productivity, and Economic Growth, Oxford: University Press, pp242-256.

Talero, Eduardo and Phillipe Gaudetter (1996) “Harnessing Information for Development,” *A Proposal for a World Bank Group Strategy*, March.

UNCTAD (2002) E-commerce and Development 2001.

UNDP (2001, 2002) Human Development Report

Walid, Sidhom (2001) Le Commerce electronique en Tunisie: La Solution e-Tijara, presentation (May).

World Bank (2003) “Tunisia Economic Monitoring Update”, September.

World Bank (various), World Development Indicators

World Economic Forum (2003) Global Competitiveness Report

World Economic Forum (2003) Global Information Technology Report

Interviews (in order of interview, September 21-27, 2003)

Ben Ghezala, Delege General, Association Professionnelle des Banques et des Etablissements Financier

Karoui, Zoubier, Consultant, Association Professionnelle des Banques et des Etablissements Financier

Jaziri, Golson, Directrice Generale des Transferts et du Commerce Exteriers, Banque Centrale de Tunisie

Gazniaa, Faycal, Ministry of Foreign Affairs

Bedoui, Rym, Representative, Global Technology Network, International Executive Service Corp.

Serghini, Mohamen Fethi, Chef de Service principal Direction Marketing et Monetique, Banque de Tunisie

Ben Abdallah, Mehdi, International Relations Department, Tunisian Union for Industry Trade and Handicraft

Miladi, Abdelhamid, Conseiller Charge des Affaires Economiques et Internationales, Tunisian Union for Industry Trade and Handicraft

Hossen, Javeleddine, Informatique and Systems d'information, Tunisian Union for Industry Trade and Handicraft
Zaghibib, Faouzi, Director General, R2i

Ben Salem, Mahjoub, Directeur Central des Systems d'information, Societe Tunisienne de Banque.

Regaieg, Nouri, Direction Centrale de la Monetique de la Telematique et de la Banque Directe, Societe Tunisienne de Banque.

Ben Ayed, Mondher, President Director General, TMI.

Ben Chaabane, Adnane, BIAT

Chaibi, Mr. Adbel Hafidh, TACC

Cherif, Mohamed Kamel, Director Direction Qualite Marketing et Relations Publiques, Banque Nationale Agricole

Garbouj, Mohamed, Director General Adjoint, Planet TN

Gharbi, Karim, President Director Generale, TTN

Lassoued, Abdelaziz, Director General, Observatoire et Centre d'information de Formation, de Documentation et d'Etudes en technologies des Communications

Triki, Mahmoud, President, South Mediterranean University

Saidane, Ezzedine, Chief Executive Officer, President Director General, Arab Banking Corp-Tunisie

Abida, Mohamed, Ingenier Principal, Ministere des Technologies de la Communication et du Transport.

Marrakchi, Maledh, Charge de Mission, Ministere des Technologies de la Communication et du Transport.

Marzouk, Khaled, Director General, Centre Informatique du Ministere des Finances.

End Notes

¹ Since the Harper (2001) report to CLDP.

² For a full discussion of the index, see Geoffrey S. Kirkman, Carlos A. Osario, Jeffrey D. Sachs, (2002) “The Networked Readiness Index: Measuring the Preparedness of Nations for the Networked World (Chapter 2),” Global Information Technology Report, World Economic Forum, Oxford University Press. This paper uses the second generation index and data as described “The Networked Readiness Index 2003-2004: Overview and Framework Analysis” (2003) by Soumitra Dutta and Amit Jain, (Chapter 1), Global Information Technology Report, World Economic Forum, Oxford University Press

³ See ITU Press Report (2003) “ITU Digital Access Index: World’s First Global ICT Ranking Education and Affordability Key to Boosting New Technology Adoption,” November 19.

⁴ The industry sectors shown are SITC categories compiled to match the categories for which research underpins the ICT intensity indicator. “Foods” is the sum of SITC 0 and 1; Energy, natural resources, and chemicals is the sum of SITC 2, 3, 4, 5; Metals&metal mfg is the sum of SITC 67, 68, 69; Consumer goods and Textiles is the sum of SITC 65 and 8; Industrial equipment and supplies is the sum of SITC 71, 72, 73, 74; Electrical products is the sum of SITC 75, 76, 77; and auto is SITC 78. These data come from the United Nations and are for 2001. Coverage of trade flows in these categories is about 95 percent. Tourism receipts as a share of exports are from the World Bank and are for 2000.

⁵ Peter K. Cornelius, Friedrich von Kirchbach, Mondhier Mimouni, Jean-Paul Pasteels, Shilpa Phadke, “Sectoral Trade Performance, “ Global Competitiveness Report, 2001-2002, Oxford University Press, 2002.

⁶ Unfortunately, Tunisia is not one of the countries for which this index is calculated, although it would be possible to do so using the referenced methodology.

⁷ This variable uses a component of the DAI on international bandwidth, and then adjusts for GNI per person using the World Bank indicators.

⁸ This is the technology subindex from the Growth Competitiveness Index in the Global Competitiveness Report (2004), World Economic Forum,

⁹ This indicator is the business usage sub-index from the NRI, Global Information Technology Report (2004), World Economic Forum.

¹⁰ The usage and readiness indicators are sub-indexes of the NRI, Global Information Technology Report (2004), World Economic Forum.

¹¹ The political and regulatory environment and market environment are sub-indexes of the NRI, , Global Information Technology Report (2004), World Economic Forum.

¹² The overall schooling is the ‘knowledge’ sub-index of the DAI, International Telecommunications Union (2003).